ELECTRONIC DEVICE WITH A LIQUID-ACTIVATED SEAL

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims the benefit of priority to U.S. Provisional Application No. 62/906,646, filed on Sep. 26, 2019, titled "ELECTRONIC DEVICE WITH A LIQUID-ACTIVATED SEAL," the disclosures of which are incorporated herein by reference in their entirety.

FIELD

[0002] The following description relates to electronic devices. In particular, the following description relates to electronic devices with a sealing layer that includes embedded particles. The particles are designed to respond to liquid exposure. In some instances, when the particles are exposed to liquid, the particles absorb the liquid, expand, and/or adhere to surrounding structures. As a result, the particles can support the sealing layer by providing a seal against liquid ingress into the electronic devices, particularly when the sealing layer undergoes some form of breakdown.

BACKGROUND

[0003] Electronic devices include multiple parts secured together by adhesives. Based on the type of adhesive used, the electronic device manufacturer may desire to warrant the electronic device as having a particular ingress protection ("IP") rating. Such a rating conveys to an end user that the electronic device will not undergo damage in certain instances of water exposure.

[0004] However, while the electronic device may initially perform in accordance with the IP rating, the liquid ingress performance may degrade over time. For example, the adhesives can wear down due to dropping the electronic device and/or thermal exposure from heat-generating components, such as processing circuitry, within the electronic device. As a result, the electronic device that could once withstand water exposure may no longer be able to do so, and further water exposure may subject the electronic device to damage.

SUMMARY

[0005] In one aspect, an electronic device is described. The electronic device may include a housing that defines a platform. The electronic device may further include a transparent layer carried by a frame. The electronic device may further include a sealing layer that secures the transparent layer with the housing. The sealing layer may include an adhesive material. The sealing layer may further include liquid-activated particles embedded in the adhesive material. In some embodiments, when exposed to a liquid, the liquid-activated particles i) absorb at least some of the liquid, and ii) adhere to at least one of the frame or the housing.

[0006] In another aspect, an electronic device is described. The electronic device may include a housing that defines a platform. The electronic device may further include a transparent layer. The electronic device may further include a sealing layer positioned on the platform. The sealing layer may secure the transparent layer with the housing. The electronic device may further include a liquid-activated particle embedded in the sealing layer. In some embodiments, a first state includes the liquid-activated particle having a first size. Further, in some embodiments, a second state includes the liquid-activated particle having a second size greater than the first size.

[0007] In another aspect, a method for sealing an electronic device is described. The method may include securing, by a sealing layer, a frame with a housing. The sealing layer may include a liquid-activated particle. The method may further include, when the liquid-activated particle is exposed to a liquid, absorbing, by the liquid-activated particle, at least some of the liquid. The method may further include, when the liquid activated-particle is exposed to a liquid, expanding, by the liquid-activated particle, from a first size to a second size greater than the first size.

[0008] Other systems, methods, features and advantages of the embodiments will be, or will become, apparent to one of ordinary skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features and advantages be included within this description and this summary, be within the scope of the embodiments, and be protected by the following claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The disclosure will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

[0010] FIG. **1** illustrates a front isometric view of an embodiment of an electronic device;

[0011] FIG. **2** illustrates a rear isometric view the electronic device shown in FIG. **1**, showing additional features;

[0012] FIG. **3** illustrates an exploded view of the electronic device shown in FIG. **1**, showing various structural features of the electronic device, in accordance with some described embodiments;

[0013] FIG. **4** illustrates a cross sectional view of the electronic device, showing the sealing layer bonded to the frame and the band;

[0014] FIG. **5** illustrates a cross sectional view of the electronic device, showing the sealing layer exposed to liquid;

[0015] FIG. **6** illustrates a cross sectional view of the electronic device shown in FIG. **5**, showing the particles in the sealing layer activated in response to the exposure to the liquid;

[0016] FIG. **7** illustrates a cross sectional view of the electronic device, showing the sealing layer exposed to liquid subsequent to damage to the electronic device;

[0017] FIG. **8** illustrates a cross sectional view of the electronic device shown in FIG. **7**, showing the particles activated in response to the exposure to the liquid;

[0018] FIG. **9**A illustrates a cross sectional view of an alternate embodiment of an electronic device, showing a modified sealing layer;

[0019] FIG. **9**B illustrates a cross sectional view of an alternate embodiment of an electronic device, showing particles embedded in a frame of the electronic device;

[0020] FIG. **9**C illustrates a cross sectional view of an alternate embodiment of an electronic device, showing a modified sealing layer;

[0021] FIG. **10**A illustrates a plan view of an alternate embodiment of an electronic device, showing a sealing layer with particles located at the corners of the electronic device;